

**SUPPLEMENTAL AMENDMENT 25<sup>th</sup> May 2006**

*In part in response to Office Communication 30<sup>th</sup> January 2006*

*USPTO Application 08 / 477 703 Mitja Hinderks 310 208 6606*



**CLEAN CLAIMS**

*What is CLAIMED is:*

*(1 -197)(Claims 1 to 197 are cancelled or renumbered, as noted in the text of the amendment.)*

- 198 *A device for the working of fluids, said device having a housing substantially enclosing a cylinder assembly comprising a cylinder with at least one circumferential depression, said assembly containing a component with at least one external circumferential projection, said external circumferential projection reciprocatable in said internal circumferential depression and both cylinder and component having working surfaces defining at least one pair of toroidal fluid working chambers which in operation have cyclically variable capacity, said housing including insulating material for the purpose of restricting heat transfer from said assembly.*
- 199 *The device of claim 198, including means to mount said cylinder assembly in said housing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.*
- 200 *The device of claim 198, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly.*
- 201 *The device of claim 198, wherein at least one of said cylinder assembly and said component is at least partly composed of ceramic material.*
- 202 *The device of claim 198, including at least one fastener, wherein said cylinder assembly includes a multiplicity of elements held in assembled condition by said fastener loaded under tension.*

- 203 *The device of claim 198, including at least one fastener, said reciprocatable component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.*
- 204 *The device of claim 198, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.*
- 203 *The device of claim 198, including at least one fastener, said reciprocatable component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.*
- 204 *The device of claim 198, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.*
- 205 *The device of claim 198, wherein said component defines a passage for fluids worked by said device.*
- 206 *The device of claim 198, including cylinder assembly surfaces and component surfaces at least partly defining said working chambers, at least one of said surfaces having at least one relatively small manufactured depression, said depression wholly fillable by fluids worked by said device.*
- 207 *The device of claim 198, including structure defining at least one volume for passage of fluids to or from at least one of said working chambers, said structure located within said housing and at least partly surrounding at least a portion of said cylinder assembly, said volume being located substantially between said structure and said cylinder assembly.*
- 208 *The device of claim 198, wherein said device is part of an internal combustion engine and said working chambers are combustion chambers.*
- 209 *The device of claim 200, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave-form configuration.*
- 210 *The device of claim 200, wherein said means comprise said component and said cylinder assembly defining complementary surfaces at least partly of an endless wave-like configuration.*

- 211 *The device of claim 200, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocatable component, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.*
- 212 *The device of claim 200, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes a bellows device.*
- 213 *The device of claim 200, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one hinged element.*
- 214 *The device of claim 200, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one pair of substantially parallel flanges separated by at least one roller, the flanges in operation moving laterally relatively to one another.*
- 215 *The device of claim 201, including at least one electrical circuit within said ceramic material.*
- 216 *The device of claim 202, wherein said fastener is of tubular form.*
- 217 *The device of claim 203, wherein said fastener is of tubular form.*
- 218 *The device of claim 204, including at least one port located in said cylinder assembly for passage of fluid to or from said working chambers, wherein said port is positioned between said pair of components.*
- 219 *The device of claim 207, wherein said structure is at least partly of insulating material for the purpose of restricting heat transfer from said volume.*
- 220 *The device of claim 209, wherein said guide is disengagable from said track.*
- 221 *A device for the working of fluids, said device comprising a housing substantially enclosing a cylinder assembly having cylinder and head portions and a component reciprocally movable within said assembly, said head portion and component defining a variable working chamber therebetween, said component having an internal passage for transfer of fluids to or from said working chamber, said chamber being separated from and pierced by said passage, said*

*housing including insulating material for the purpose of restricting heat transfer from said assembly.*

- 222 *The device of claim 221, including means to mount said cylinder assembly in said housing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.*
- 223 *The device of claim 221, including means between said cylinder assembly and said component so as to cause said component to rotate relative to said cylinder while reciprocating in said cylinder assembly.*
- 224 *The device of claim 221 [[55]], wherein said cylinder assembly is substantially made of ceramic material.*
- 225 *The device of claim 221, wherein said component is at least partly composed of ceramic material.*
- 226 *The device of claim 221, including at least one fastener, wherein said cylinder assembly includes a multiplicity of elements held in assembled condition by said at least one fastener loaded under tension.*
- 227 *The device of claim 221, including at least one fastener, said reciprocatable component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.*
- 228 *The device of claim 221, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.*
- 229 *The device of claim 221, including cylinder assembly surfaces and component surfaces at least partly defining said working chamber, at least one of said surfaces having at least one relatively small manufactured depression, said depression wholly fillable by fluids worked by said device.*
- 230 *The device of claim 221, including structure defining at least one volume for passage of fluids to or from said working chamber, said structure located within said housing and at least*

*partly surrounding at least a portion of said cylinder assembly, said volume being located substantially between said structure and said cylinder assembly.*

- 231 *The device of claim 221, wherein said device is part of an internal combustion engine and said working chamber is a combustion chamber.*
- 232 *The device of claim 223, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave-form configuration.*
- 233 *The device of claim 223, wherein said means comprise said component and said cylinder assembly define complementary surfaces at least partly of an endless wave-like configuration.*
- 234 *The device of claim 223, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocatable component, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.*
- 235 *The device of claim 224, including at least one electrical circuit within said ceramic material.*
- 236 *The device of claim 225, including at least one electrical circuit within said ceramic material.*
- 237 *The device of claim 226, wherein said fastener is of tubular form.*
- 238 *The device of claim 227, wherein said fastener is of tubular form.*
- 239 *The device of claim 228, including at least one port located in said cylinder assembly for passage of fluid to or from said working chamber, wherein said port is positioned between said pair of components.*
- 240 *The device of claim 230, wherein said structure is at least partly of insulating material for the purpose of restricting heat transfer from said volume.*
- 241 *The device of claim 232, wherein said guide is disengagable from said track.*
- 242 *A device for the working of fluids comprising at least one cylinder assembly containing a component reciprocatable therein, said component having two longitudinal extremities and at*

*least one circumferential projection, said cylinder assembly having at least one internal circumferential depression in which said projection is positioned to reciprocate, said projection and depression forming a pair of toroidal fluid working chambers of cyclically variable capacity, said component having at least one internal passage for movement of fluids to or from said working chambers, said assembly including a multiplicity of elements of ceramic material held in assembled and abutted condition by at least one fastener loaded in tension.*

- 243 *The device of claim 242, including a housing in which said cylinder assembly is mounted.*
- 244 *The device of claim 242, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly.*
- 245 *The device of claim 242, including a crankshaft and a connecting rod, to which crankshaft an extremity is linked by said connecting rod.*
- 246 *The device of claim 242, wherein at least one of said extremities in normal operation transfers loads associated with said working chambers, said loads in operation being principally in tension.*
- 247 *The device of claim 242, wherein said component is at least partly composed of ceramic material.*
- 248 *The device of claim 242, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.*
- 249 *The device of claim 242, including at least one second fastener, said reciprocatable component comprising a multiplicity of elements, said elements being held in assembled condition by said second fastener loaded in tension.*
- 250 *The device of claim 242, including filamentary material contained in said internal passage.*
- 251 *The device of claim 242, wherein said component has at least one surface at least partly defining said working chambers, said surface having at least one relatively small*

*manufactured depression wholly fillable by fluids worked by said device.*

- 252 *The device of claim 242, wherein said cylinder assembly has at least one surface at least partly defining said working chambers, said surface having at least one relatively small manufactured depressions wholly fillable by fluids worked by said device.*
- 253 *The device of claim 242, wherein said fastener is of tubular form.*
- 254 *The device of claim 242, including at least one electrical circuit within said ceramic material.*
- 255 *The device of claim 242, including a rotatable shaft and a load transfer mechanism, said component being linked to said rotatable shaft by said load transfer mechanism.*
- 256 *The device of claim 242, including structure defining a volume for passage of fluids to or from said working chambers, said structure substantially surrounding at least a portion of said cylinder assembly, said volume being located substantially between said structure and said cylinder assembly.*
- 257 *The device of claim 242, wherein said device is part of an internal combustion engine and said working chambers are combustion chambers, said engine in operation generating hot exhaust gas.*
- 258 *The device of claim 243, wherein said housing is at least partially composed of thermally insulating material.*
- 259 *The device of claim 243, including means to mount said cylinder assembly in said housing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.*
- 260 *The device of claim 244, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave form configuration.*
- 261 *The device of claim 244, wherein said means comprise said component and said cylinder assembly define complementary surfaces at least partly of endless wave-like configurations.*

- 262 *The device of claim 247, including at least one electrical circuit within said ceramic material.*
- 263 *The device of claim 248, wherein said pair of components define a port therebetween for passage of fluid to or from said working chambers.*
- 264 *The device of claim 249, wherein said second fastener is of tubular form.*
- 265 *The device of claim 250, wherein said filamentary material includes substance having catalytic effect to hasten chemical reaction in said working fluid.*
- 266 *The device of claim 255, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.*
- 267 *The device of claim 255, wherein said mechanism comprises a bellows device.*
- 268 *The device of claim 255, wherein said mechanism includes at least one hinged element.*
- 269 *The device of claim 255, wherein said mechanism includes at least one pair of substantially parallel flanges separated by at least one roller, the flanges in operation moving laterally relatively to one another.*
- 270 *The device of claim 256, including filamentary material contained in said volume.*
- 271 *The device of claim 257, wherein said device is part of a compound engine including said internal combustion engine and a second engine.*
- 272 *The device of claim 260, wherein said guide is disengagable from said track.*
- 273 *The device of claim 270, wherein said filamentary material includes substance having catalytic effect to hasten chemical reaction in said working fluid.*
- 274 *The device of claim 271, wherein said second engine is a turbine engine, in operation said hot exhaust gas being used to power said turbine engine.*
- 275 *The device of claim 271, wherein said second engine is a steam engine, in operation energy*

from said hot exhaust gas being used to power said steam engine.

- 276 *The device of claim 271, wherein said second engine is a Stirling engine, in operation energy from said hot exhaust gas being used to power said Stirling engine.*
- 277 *A device for the working of fluids comprising a structure, a cylinder assembly having at least one circumferential depression and mounted in and at least partly surrounded by said structure and containing a component reciprocatable in said assembly, said component having two cylindrical ends each with at least one opening and at least one circumferential projection reciprocatable in said circumferential depression in said assembly to form at least one pair of toroidal fluid working chambers of cyclically variable capacity, said component having at least one internal passage for transfer of fluids to or from said working chambers, said structure including insulating material to restrict heat transfer from said assembly, in operation said openings permitting transfer of fluid between said passage and said working chambers.*
- 278 *The device of claim 277, including a housing which substantially encloses said structure and said cylinder assembly.*
- 279 *The device of claim 277, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly.*
- 280 *The device of claim 277, wherein at least one of said cylinder assembly and said component is at least partly composed of ceramic material.*
- 281 *The device of claim 277, including at least one fastener, wherein said cylinder assembly includes a multiplicity of elements held in assembled condition by said at least one fastener loaded under tension.*
- 282 *The device of claim 277, including at least one fastener, said reciprocatable component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.*
- 283 *The device of claim 277, wherein said assembly comprises at least one pair of substantially*

*identical components arranged in mirror image about one another.*

- 284 *The device of claim 277, including cylinder assembly surfaces and component surfaces at least partly defining said working chambers, at least one of said surfaces having at least one relatively small manufactured depression, said depression wholly fillable by fluids worked by said device.*
- 285 *The device of claim 277, including structure defining at least one volume for passage of fluids to or from said working chambers, said structure located within said housing and at least partly surrounding at least a portion of said cylinder assembly, said volume being located substantially between said structure and said cylinder assembly.*
- 286 *The device of claim 277, wherein said device is part of an internal combustion engine and said working chambers are combustion chambers.*
- 287 *The device of claim 278, including means to mount said cylinder assembly in said housing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.*
- 288 *The device of claim 278, wherein said housing is at least partially composed of thermally insulating material.*
- 289 *The device of claim 279, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave form configuration.*
- 290 *The device of claim 279, wherein said means comprise said component and said cylinder assembly define complementary surfaces at least partly of endless wave-like configurations.*
- 291 *The device of claim 279, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocatable component, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.*
- 292 *The device of claim 280, including at least one electrical circuit within said ceramic material.*
- 293 *The device of claim 281, wherein said fastener is of tubular form.*

- 294 *The device of claim 282, wherein said fastener is of tubular form.*
- 295 *The device of claim 283, including at least one port located in said cylinder assembly for passage of fluid to or from said working chambers, wherein said port is positioned between said pair of components.*
- 296 *The device of claim 289, wherein said guide is disengagable from said track.*
- 297 *A device for the working of fluids, said device having a cylinder assembly comprising a cylinder with at least one internal circumferential depression, said assembly containing a component with at least one external circumferential projection, said external circumferential projection reciprocating in said circumferential depression and both having working surfaces defining at least one pair of toroidal fluid working chambers which in operation have cyclically variable capacity, said assembly including a multiplicity of elements of ceramic material held in assembled and abutted condition by at least one fastener loaded in tension.*
- 298 *The device of claim 297, including a housing, wherein said housing at least partly encloses said cylinder assembly.*
- 299 *The device of claim 297, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly.*
- 300 *The device of claim 297, wherein said component is at least partly composed of ceramic material.*
- 301 *The device of claim 297, including at least one second fastener, said reciprocatable component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.*
- 302 *The device of claim 297, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.*
- 303 *The device of claim 297, wherein said component defines a passage for fluids worked by said device.*

- 304 *The device of claim 297, including cylinder assembly surfaces and component surfaces at least partly defining said working chambers, at least one of said surfaces having at least one relatively small manufactured depression, said depression wholly fillable by fluids worked by said device.*
- 305 *The device of claim 297, wherein said fastener is of tubular form.*
- 306 *The device of claim 297, including at least one electrical circuit within said ceramic material.*
- 307 *The device of claim 297, including structure defining at least one volume for passage of fluids to or from said working chambers, said structure located within said housing and at least partly surrounding at least a portion of said cylinder assembly, said volume being located substantially between said structure and said cylinder assembly.*
- 308 *The device of claim 297, wherein said device is part of an internal combustion engine and said working chambers are combustion chambers.*
- 309 *The device of claim 298, including means to mount said cylinder assembly in said housing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.*
- 310 *The device of claim 298, wherein said housing is at least partially composed of thermally insulating material.*
- 311 *The device of claim 299, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave-form configuration.*
- 312 *The device of claim 299, wherein said means comprise said component and said cylinder assembly define complementary surfaces at least partly of an endless wave-like configuration.*
- 313 *The device of claim 299, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocatable component, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.*
- 314 *The device of claim 299, including a rotatable shaft and a load transfer mechanism between*

*said shaft and said component, wherein said mechanism includes a bellows device.*

- 315 *The device of claim 299, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one hinged element.*
- 316 *The device of claim 299, including a rotatable shaft and a load transfer mechanism between said shaft and said component, wherein said mechanism includes at least one pair of substantially parallel flanges separated by at least one roller, the flanges in operation moving laterally relatively to one another.*
- 317 *The device of claim 300, including at least one electrical circuit within said ceramic material.*
- 318 *The device of claim 301, wherein said second fastener is of tubular form.*
- 319 *The device of claim 302, including at least one port located in said cylinder assembly for passage of fluid to or from said working chambers, wherein said port is positioned between said pair of components.*
- 320 *The device of claim 310, wherein said guide is disengagable from said track.*
- 321 *A device for the working of fluids comprising a structure at least partly enclosing a cylinder assembly, a component reciprocatable within said assembly, filamentary material, said component having at least one circumferential projection, said cylinder assembly having at least one circumferential depression in which said projection is positioned to reciprocate, said projection and depression defining a pair of toroidal fluid working chambers of cyclically variable capacity, said structure defining a volume for passage of fluids to or from said working chambers, said volume at least partly positioned between said structure and portion of said cylinder assembly, said volume containing said filamentary material.*
- 322 *The device of claim 321, including a housing, wherein said housing substantially encloses said structure and said cylinder assembly.*
- 323 *The device of claim 321, including means between said assembly and said component so as to cause said component to rotate relative to said assembly while reciprocating in said assembly.*

- 324 *The device of claim 321, wherein at least one of said cylinder assembly and said component is at least partly composed of ceramic material.*
- 325 *The device of claim 321, including at least one fastener, wherein said cylinder assembly includes a multiplicity of elements held in assembled condition by said at least one fastener loaded under tension.*
- 326 *The device of claim 321, including at least one fastener, said reciprocatable component comprising a multiplicity of elements, said elements being held in assembled condition by said fastener loaded in tension.*
- 327 *The device of claim 321, wherein said assembly comprises at least one pair of substantially identical components arranged in mirror image about one another.*
- 328 *The device of claim 321, wherein said component defines a passage for fluids worked by said device.*
- 329 *The device of claim 321, including cylinder assembly surfaces and component surfaces at least partly defining said working chambers, at least one of said surfaces having at least one relatively small manufactured depression, said depression wholly fillable by fluids worked by said device.*
- 330 *The device of claim 321, wherein said filamentary material includes substance having catalytic effect to hasten chemical reaction in said working fluid.*
- 331 *The device of claim 321, wherein said structure is at least partly composed of thermally insulating material.*
- 332 *The device of claim 118, wherein said device is part of an internal combustion engine and said working chambers are combustion chambers.*
- 333 *The device of claim 322, including means to mount said cylinder assembly in said housing to enable said cylinder assembly to rotate while said component is reciprocating in said cylinder assembly.*

- 334 *The device of claim 322, wherein said housing is at least partly of thermally insulating material.*
- 335 *The device of claim 323, wherein said means comprise a guide and an endless track, said guide movable in said endless track, said track having a multiple wave form configuration.*
- 336 *The device of claim 323, wherein said means comprise said component and said cylinder assembly define complementary surfaces at least partly of endless wave-like configurations.*
- 337 *The device of claim 323, including a rotatable shaft and a load transfer mechanism between said shaft and said rotatable and reciprocatable component, wherein said mechanism comprises a hollow shaft with interior splines slidable on a shaft with external splines.*
- 338 *The device of claim 324, including at least one electrical circuit within said ceramic material.*
- 339 *The device of claim 325, wherein said fastener is of tubular form.*
- 340 *The device of claim 326, wherein said fastener is of tubular form.*
- 341 *The device of claim 327, including at least one port located in said cylinder assembly for passage of fluid to or from said working chambers, wherein said port is positioned between said pair of components.*
- 342 *The device of claim 328, including filamentary material contained in said passage, wherein said filamentary material includes substance having catalytic effect to hasten chemical reaction in said working fluid.*
- 343 *The device of claim 335, wherein said guide is disengagable from said track.*
- 344 *The device of claims 198, 201, 202, 208; 221, 225, 226, 231; 243, 257; 277, 280, 286; 297, 308, 310; 321, 324, 332, 334, including a crankshaft and a connecting rod, to which crankshaft said component is mechanically linked at least in part by said connecting rod.*
- 345 *The device of claims 198, 201, 202, 208; 221, 225, 226, 231; 243, 257; 277, 280, 286; 297,*

308, 310; 321, 324, 332, 334, said device having an operating cycle and including at least one crankshaft, to which said component is connected by at least one mechanical linkage in normal operation substantially loaded in tension, said linkage transferring loads associated with said working chambers to or from said crankshaft primarily by a pulling action rather than a pushing action.

- 346 *The device of claims 198, 199, 200, 201, 208; 221, 222, 223, 224, 231; 279, 280, 286, 287, 288; 297, 299, 308, 309, 310, including a first space for transfer of fluid to at least one said working chamber, at least one additional space for transfer of fluid from said working chamber, wherein at least one of said spaces contains filamentary material, said filamentary material including at least some substance having catalytic effect to hasten chemical reaction in said fluid.*
- 347 *The device of claims 199, 200, 201; 222, 223, 226; 244, 258, 259; 279, 280, 287, 288; 299, 309, 310; 323, 324, 333, 334, wherein said device is part of an internal combustion engine and at least one said fluid working chamber functions as a combustion chamber, said engine having no purposely designed means for transferring heat from said combustion chamber and being capable of operation for an indefinite period.*

END OF CLAIMS